

Name: Class notes Date: 01/16/18 per 1/4

RADICALS ARE IN SIMPLEST FORM WHEN

- ☆ NO perfect square factors other than 1 are under the radical.
- ☆ NO fractions are under the radical
- ☆ NO radicals are in the denominator

What is the prime factorization of each number?

1. 54

$\begin{matrix} & \wedge & \\ 9 & & 6 \\ \wedge & & \wedge \\ 3 & 3 & 2 \end{matrix}$

$= 3^3 \cdot 2^1$

different trees
 create the same
 prime-factors OR \downarrow

$\begin{matrix} & \wedge & \\ 3 & & 18 \\ & \wedge & \wedge \\ & 9 & 2 \\ & \wedge & \\ & 3 & 3 \end{matrix}$

$= 3^3 \cdot 2^1$

2. 98

Simplify:

3. $\sqrt{45}$

$\begin{matrix} & \wedge & \\ 3 & & 15 \\ & \wedge & \\ & 3 & 5 \end{matrix}$

$= \sqrt{3 \cdot 3 \cdot 5}$

$= 3\sqrt{5}$

pairs of factors come out.

4. $\sqrt{20}$

5. $\sqrt{12}$

6. $\sqrt{50}$

7. $\sqrt{200}$

8. $\sqrt{125}$

$\begin{matrix} & \wedge & \\ 5 & & 25 \\ & \wedge & \wedge \\ & 5 & 5 \end{matrix}$

$= \sqrt{5 \cdot 5 \cdot 5}$

$= 5\sqrt{5}$

9. $-4\sqrt{40}$

10. $\sqrt{99}$

11. $\sqrt{108}$

$\begin{matrix} & \wedge & \\ 2 & & 20 \\ & \wedge & \wedge \\ & 4 & 5 \\ & \wedge & \\ & 2 & 2 \end{matrix}$

$= -4\sqrt{2 \cdot 2 \cdot 2 \cdot 5}$

$= -4 \cdot 2\sqrt{2 \cdot 5}$

$= -8\sqrt{10}$

SIMPLIFYING VARIABLES AS RADICANDS

☆ **Even Exponents** – Take half of the exponent OUTSIDE the radical and leave NOTHING under the radical sign

☆ **Odd Exponents** – Leave ONE exponent UNDER the radical and take HALF of the rest OUTSIDE the radical sign

12. $\sqrt{x^6}$

$$= \sqrt{\underbrace{x \cdot x}_{\text{pair}} \cdot \underbrace{x \cdot x}_{\text{pair}} \cdot \underbrace{x \cdot x}_{\text{pair}}}$$

$$= x^3$$

again, pairs
come out

13. $\sqrt{49x^5}$

$$= \sqrt{7 \cdot 7 \cdot \underbrace{x \cdot x}_{\text{pair}} \cdot \underbrace{x \cdot x}_{\text{pair}} \cdot x}$$

$$= 7x^2\sqrt{x}$$

14. $\sqrt{36y^4}$

15. $\sqrt{16x^2}$

16. $\sqrt{a^3b^5}$

17. $\sqrt{18x^7y^4}$

18. $\sqrt{90x^5y}$

19. $-2\sqrt{24x^2y^9}$

20. $-2\sqrt{15x^2y^8}$

$$= -2\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot \underbrace{x \cdot x}_{\text{pair}} \cdot \underbrace{y \cdot y \cdot y \cdot y \cdot y}_{\text{pair}}}$$

$$= -2 \cdot 2 \cdot x \cdot y^4 \sqrt{2 \cdot 3 \cdot y}$$

$$= -4xy^4\sqrt{6y}$$

21. $\sqrt{196x^7y^8}$

22. $\sqrt{450c^5}$

23. $3\sqrt{48y^{12}}$